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REMARKS

Claim 4 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In response to the rejection, the applicant amended claim 4 by deleting the rejected phrase.

Claims 1-12, 15-17, 19-25, 30-33 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kanedo et al. in view of Cho et al.

In response to the rejection, the applicant amended claim 1 by limiting it further by incorporating the limitation of claims 5, 6, and 21, and the following limitations:

(1) "wherein each of the micromirrors is controlled independently"

Limitation (1) is supported by the descriptions of claims 7-9 and 22-26, and thus is not a new matter. All of the invention concepts in these claims require that each of the micromirrors, which construct the micromirror array lens, should be independently controlled.

Also, claims 13, 14, 18 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kaneda et al. in view of Cho et al. and further in view of Watanabe et al.

In response to the rejection, the applicant amended claim 1 as explained above.

The present invention is distinct in the following points from the references.

I. The lens of "Proceeding of SPIE Vol. 5055: 278-286" can not compensate aberration because micromirrors at the same radial position have same displacements. Please refer to Fig. 8 of the reference. To compensate aberration, the micromirrors should be controlled independently as described in the amended claim 1. It is new idea of the present invention that the micromirror array lens can change focal length and compensate aberration by each of the micromirrors being controlled independently at the same time.

Micromirror array lens in the present invention is a reflective-type lens while the dynamic focusing lens in "SPIE Vol. 4075: 24-31" is a refractive-type lens. An imaging system using reflective-type lens must be different from the one using refractive-type lens. In order to make an

imaging system using reflective-type lens, the lens should be tilted about optical-axis. That is, when a lens is tilted about optical axis, the system cannot avoid a lot of aberration creeping in. Therefore, the micromirror array lens (MMAL) should be an optical element to be able to compensate the large amount of aberration. In the present invention, the applicant invented new idea of tilting MMAL in three-dimensional imaging device and compensating the aberration generated by the tilting.

To make a compact three-dimensional imaging device, the reflective lens or MMAL should be tilted. Because the lens is tilted, the three-dimensional imaging device cannot avoid the large optical distortion and aberrations. Boyd et al. did not disclose any idea to compensate optical distortion and aberrations. Only the present invention describes that.

II. This three-dimensional imaging device is compact. Please refer to page 10, line 4 of the original specification.

It is a great advantage that three-dimensional imaging device is compact. Especially, the compactness of the three-dimensional imaging device is critical in portable devices. The dynamic focusing lens in "SPIE Vol. 4075: 24-31" is much larger than the current invention because multi-layered piezoelectric bimorph actuator requires large volume, with which it is impossible to make compact three-dimensional imaging system. Fig. 1 shows that the invention is very simple and compact. Because MMAL is controlled by electrostatic or electromagnetic force, additional space for control system other than electronic circuit is not necessary. This new idea can make this invention applicable to many portable devices. Their commercial benefit of compact three-dimensional imaging system is huge.

III. This invention provides a three-dimensional imaging device that consumes minimal power. Please refer to page 10, lines 4 – 6 of the original specification.

Limitation of battery usage time is a big issue for the portable device and the three-dimensional imaging device using MMAL consumes minimal power because it is controlled by electrostatic actuator. Electrostatic actuator was described in Boyd et al. But, the low power consuming three-dimensional imaging device has never been implied and surely cannot be obvious to a person of ordinary skill. "Compensation" of Section I, "compact system" of section

II, and "low power consumption" of this section are great advantages of our invention, especially for the portable device application.

IV. An object which does not lie on the optical axis can be imaged by the micromirror array lens without macroscopic mechanical movement of the three-dimensional imaging device. Please refer to page 6, lines 19-22 of the original specification.

MMAL can change optical axis without macroscopic mechanical movement. This new inventive concept is neither described nor implied in Boyd et al.

V. Low production cost, mass productivity. Please refer to page 8, lines 1-3 of the original specification.

MMAL is fabricated by microelectronics manufacturing technology. Therefore, it is well adapted to the mass production.

Claims 7-13 and 15-19 were amended to straighten out the claim reference matters caused by deleting claim 5.

The applicant finds the above new features and advantages, and the applicant is sure that the present invention is not obvious over the references.

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CONCLUSION

The applicant believes that the rejections were obviated by the amendment of claims, and the application is now in condition for allowance: therefore, reexamination, reconsideration and allowance of the claims are respectively requested. If there are any additional comments or requirements from the examination, the applicant asks for a non-final office action.

The Commissioner is hereby authorized to charge payment of any additional fees associated with this communication, or credit any over-payment to Deposit Account No. 16-0310.

Very truly yours,
Park & Sutton LLP

Dated: 8/4, 2005

By: _____
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